TopView – Closing Data Gaps in Urban Energy and Climate Planning with Remote Sensing and AI

Franz Mauthner[1], Ivana Gramatikova[2], Anna Kovacs-Györi[3], Markus Biberacher[4], Max Aragon[5], Gerhard Neuhold[6]

Introduction

Urban energy and climate adaptation planning often rely on incomplete or outdated spatial data. TopView combines remote sensing, geographic object-based Image analysis (GEOBIA) and AI to generate planning-ready GIS datasets for rooftop characterization, urban heat analysis and thermal building assessment. The project supports municipalities and regions with a stronger evidence base for climate adaptation and energy transition planning.

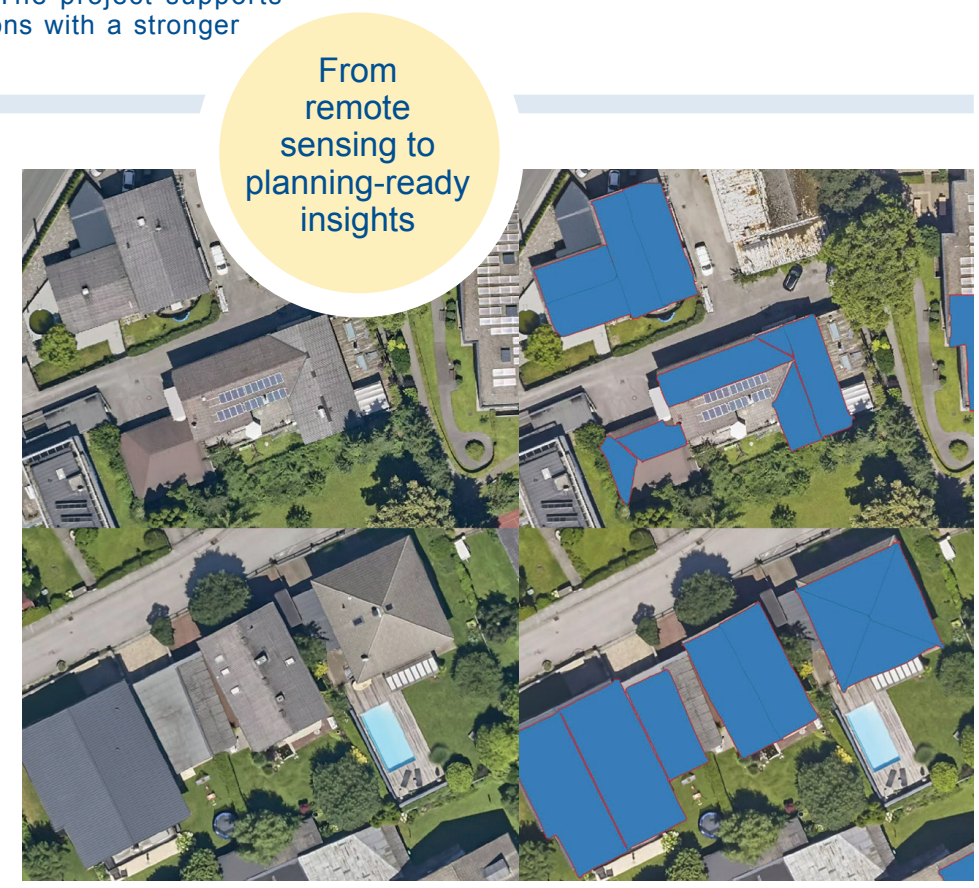
Project objectives

- Close critical data gaps in urban energy and climate planning
- Develop scalable remote sensing and AI workflows
- Generate interoperable GIS-ready datasets for municipalities and regions
- Support evidence-based planning for mitigation, adaptation and infrastructure decisions

Approach and use cases

TopView integrates thermal remote sensing, orthophotos, surface models, GEOBIA and AI-based image analysis in scalable workflows. The resulting data products are harmonized and transferred into GIS-ready layers for municipal and regional planning.

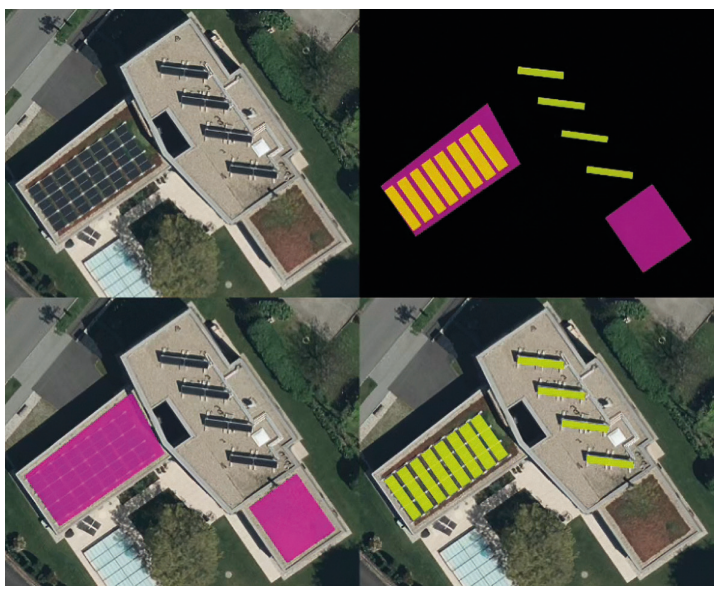
UC1 – Roof form identification for solar potential analysis
UC2 – Rooftop object detection: PV, solar thermal, cooling units and green roofs
UC3 – Time-series analysis of urban heat islands based on continuous land surface temperature data
UC4 – Thermal building characterization: unheated or thermally inefficient buildings
UC5 – Integrated rooftop performance assessment using thermal, RGB and vegetation data



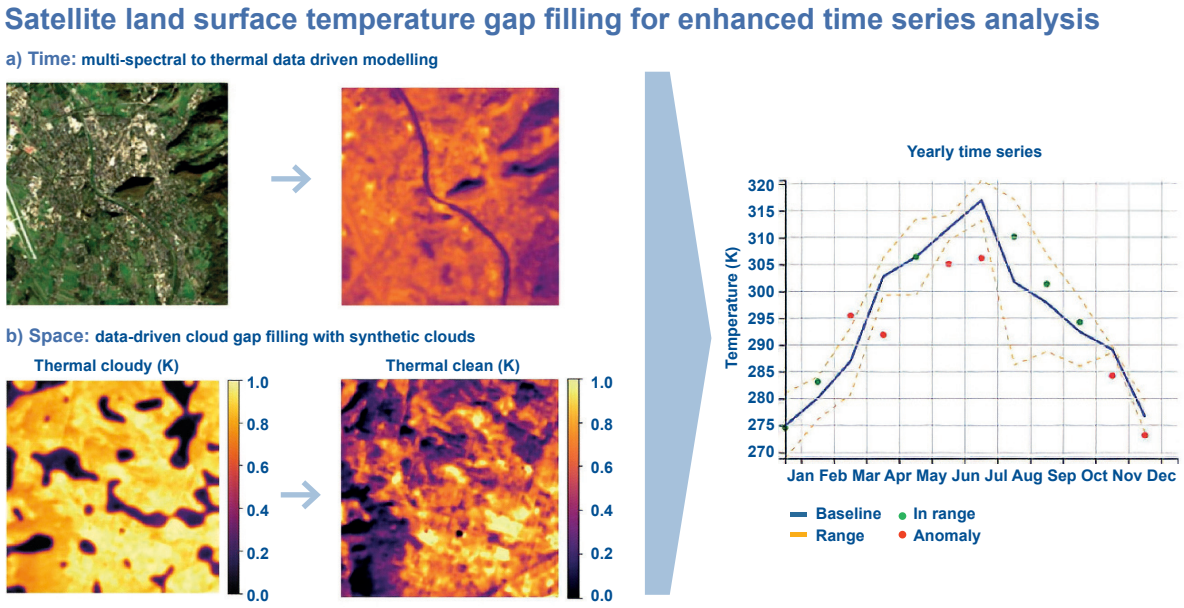
UC1: Automated roof form identification for solar potential analysis (© iSPACE plus GmbH).

Results

TopView delivers planning-relevant geospatial data products across five use cases. Key outputs include roof-level geometry and segmentation data, mapped rooftop objects, continuous land surface temperature time series, building-level thermal indicators, and integrated rooftop performance indicators combining thermal, vegetation and morphological data.



UC2: AI-based rooftop object detection of PV installations, solar thermal systems, cooling units and green roofs (© N Vision).



UC3: Time-series analysis of urban heat islands based on continuous land surface temperature data (© Termatics).

Conclusion & Outlook

TopView shows how remote sensing and AI can be translated into harmonized, planning-ready datasets for urban energy and climate adaptation planning. By linking rooftop analysis, thermal building information and urban heat monitoring, the project strengthens the evidence base for municipalities and regions. Ongoing work focuses on validation, integration across use cases and transfer into practical planning workflows.

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AEE – Institute for Sustainable Technologies
Feldgasse 19, 8200 Gleisdorf, Austria
+43 (0) 3112 5886 223
f.mauthner@aee.at, www.aee-intec.at

1 AEE INTEC, 2 SIR - Salzburg Institute for Regional Planning and Housing, 3 Energy Agency Styria gGmbH, 4 iSPACE plus GmbH, 5 Termatics, 6 N Vision Software GmbH